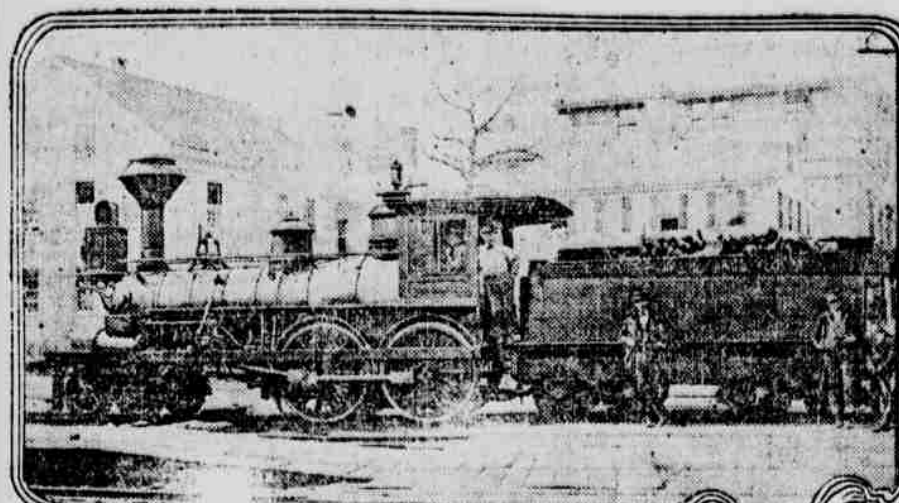
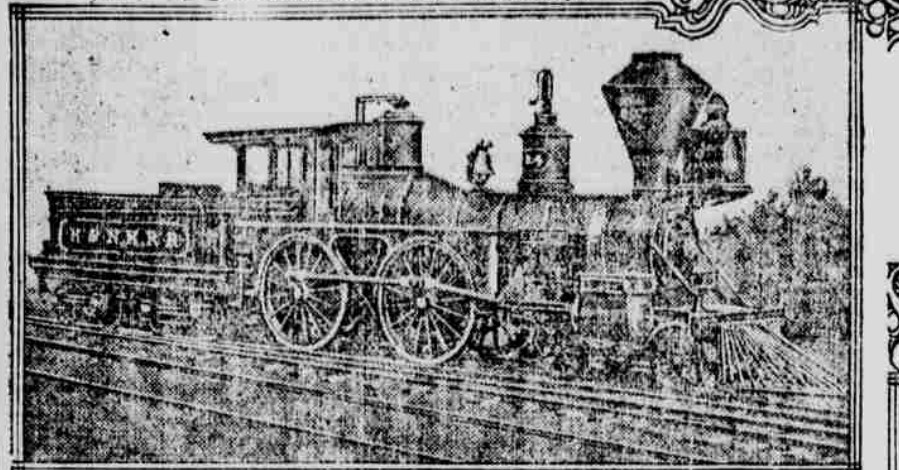


STEPS IN TRANSPORTATION'S PROGRESS

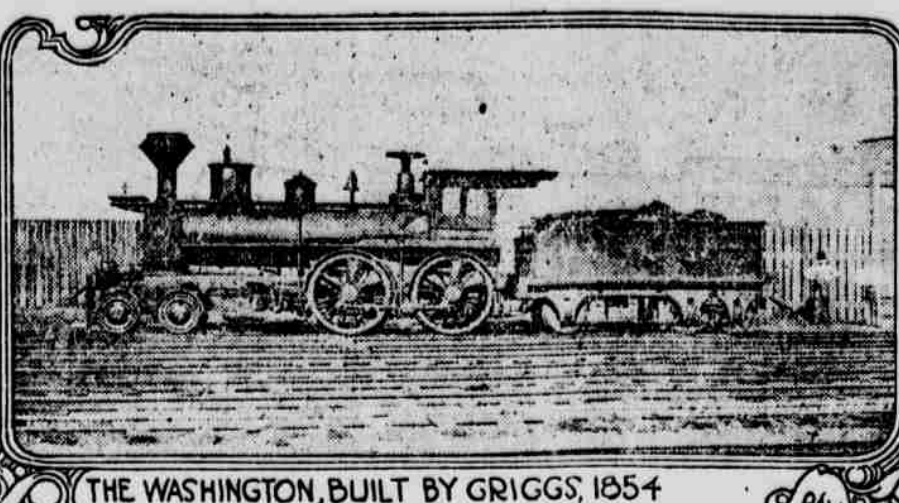
The Evolution of the Locomotive From the Pygmies of the Past to the Giants of the Present—What Becomes of Old Locomotives and Railway Cars and Those That Have Outlived Their Usefulness?



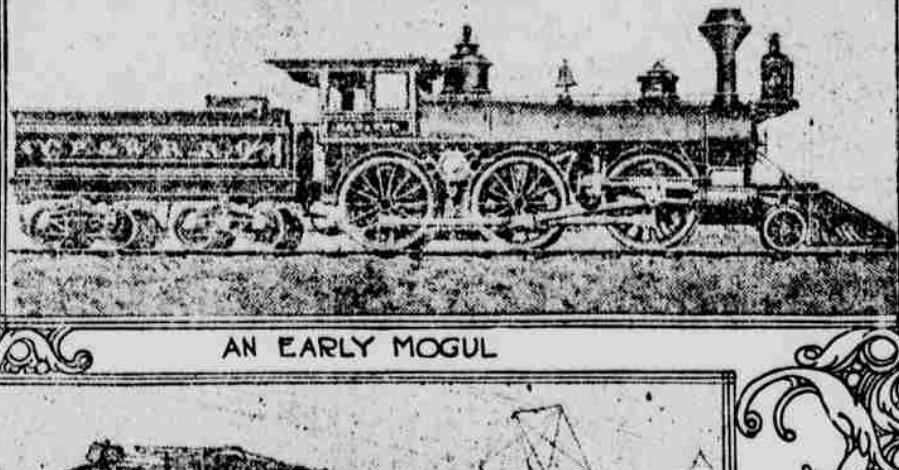
THE LEOMINSTER OF THE B. & F., 1849.



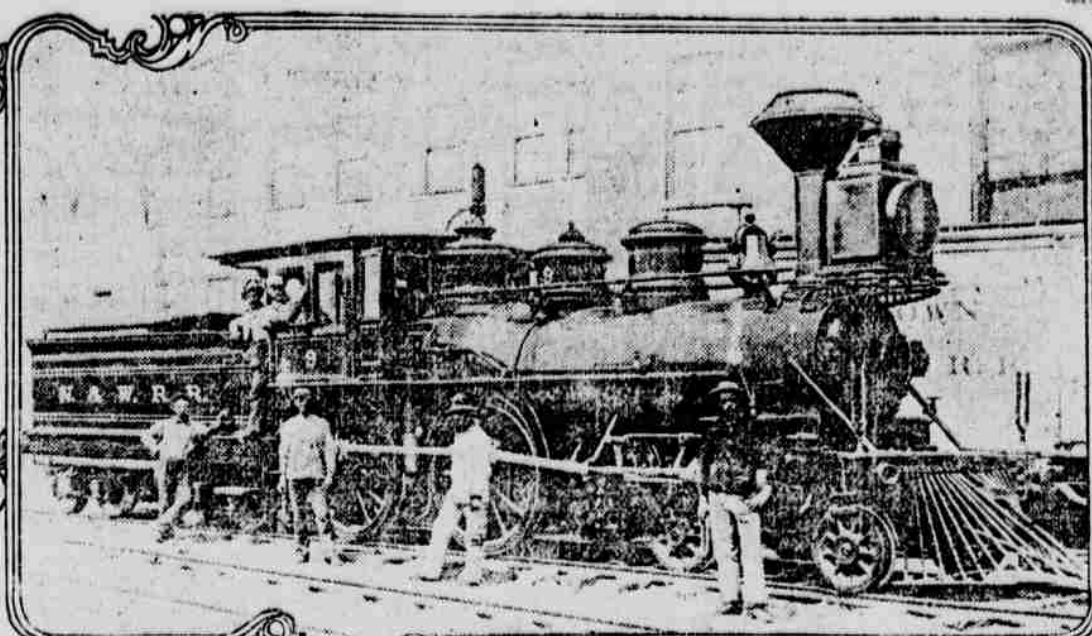
THE COMET OF THE HARTFORD AND NEW HAVEN



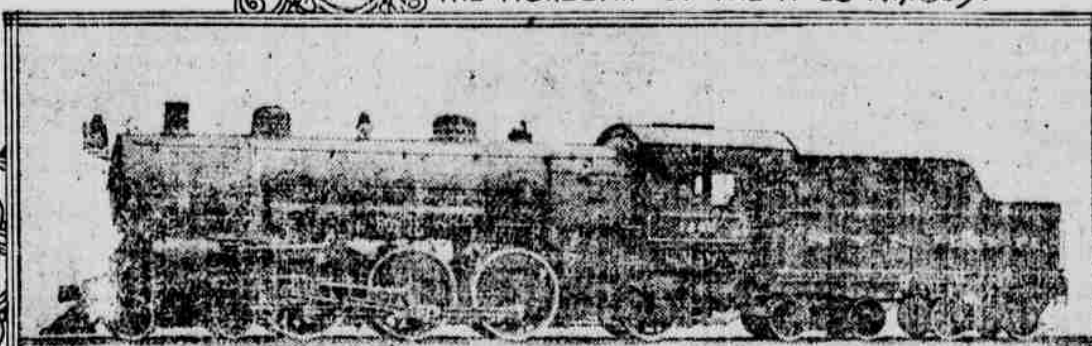
THE WASHINGTON, BUILT BY GRIGGS, 1854



AN EARLY MOGUL



THE "MOHEGAN" OF THE N. & W., 1859.



THE NEW HAVEN'S GIANTS OF TODAY

THE progress of transportation in this country and its present high state of efficiency can be emphasized in no better way than by a comparison of the large and powerful steam and electric locomotives used by the New Haven today with some of their prototypes of some of the old New England railroads which now form part of the New Haven's system in southern New England.

Comparing these pygmies of the past with the giant locomotives of today brings to the mind at once the enormous strides made by rail transportation in the last three-quarters of a century and presents one of the chief reasons for the country's growth in this period. These locomotives, seen in their successive types, are like steps in the ladder of national progress.

Some Historic Railroads.
Many types of locomotives have been seen on the New Haven's lines, types representing every stage of the locomotive's marvelous evolution, and this is because the New Haven is made up of more of the original railroads of this country than any other large system. The development of the locomotive is indissolubly linked with the history of these railroads.

The Earliest Locomotives.
Between the very early locomotives, such as that seen hauling a train on the old Hartford and New Haven in 1841, and the latest Pacific type engines used to haul the New Haven's fast passenger trains there is little resemblance. Yet in these curious contrivances, spouting smoke from their tall smokestacks and at first barely beating out the horse, is seen the germ of the idea now embodied in all its completeness of detail in the engines of today. It remained for mechanical genius to perfect this idea in order to make the transportation industry the great instrument of commerce and social intercourse that it has now become.

The Governor Bradford, 1844.
Representing a considerable advance over the very early types of locomotives is the Governor Bradford, which was once familiar to patrons of the Old Colony. Here the locomotive was actually beginning to take shape. Built by the old Boston firm of Hinckley & Drury in 1844, this engine weighed fourteen tons and had four cylinders and four foot drivers. Its cylinders had a diameter of five feet. In 1885 this old engine, rebuilt and modernized to some extent, was still doing duty as a switch engine in the Boston yards.

The Uncle Tom, 1844.
A contemporary of the Governor Bradford and of the same type was the Uncle Tom, used at one time on the Boston, Clinton and Fitchburg, now merged in the New Haven system. Built some time in the forties, this curious engine for years hauled a local passenger train consisting of two cars between Fitchburg and Sterling, Mass. Like all early engines, it burned wood and for the purpose of letting off steam had a tall pipe close to the cab. But the feature of this engine which attracted attention through the countryside was the figure of the little darky, Uncle Tom, mounted in front and used as a flag holder. This engine had four foot drivers.

The Leominster of the B. & F., 1849.

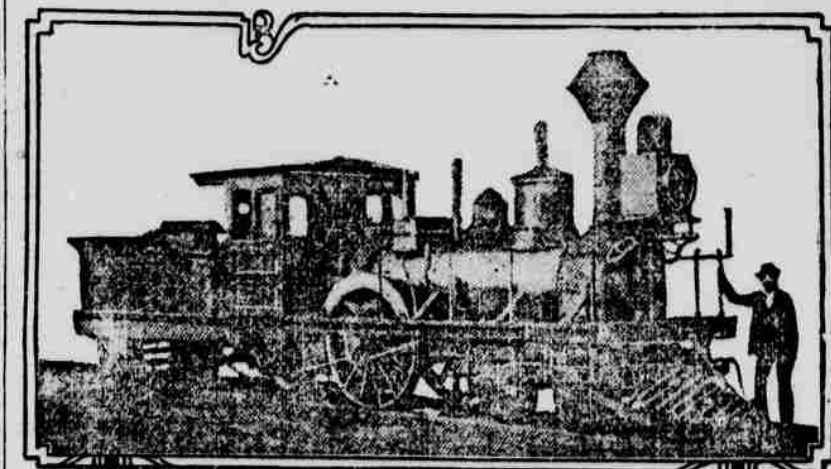
Appearing only five years after the Governor Bradford and the product of the same builders, the Leominster, also of the Boston, Clinton and Fitchburg, bears interesting testimony to the rapidity with which the evolution of the locomotive was proceeding in those years and reveals the constant study the early designers were making of the problems of increasing the power, weight and speed of their creations. This locomotive weighed twenty-four

tons, had cylinders 16 by 20 inches and four and one-half foot drivers. For many years it ran between Fitchburg and South Framingham.

The Washington, Built by Griggs, 1854.
An engine of a somewhat different type and of later design was the Washington of the Boston and Providence. This engine was built in the Roxbury shops of the company by G. S. Griggs, the road's master mechanic, who turned out many famous engines. This locomotive was constructed in 1854 and for years made fast time over the line between Boston and Providence, now traveled by the New Haven's big Pacifics and its limited trains. The Washington weighed twenty-four and three-quarter tons, its cylinders were 15 by 20 and its driving wheels five feet in diameter.

Like many engines of this period, the Washington was what is known as an "inside connected engine." Its main rods being between the frames and working on a cranked axle joining the main driving wheels. This type is still followed by English engine builders. It was discarded years ago by American builders. In this type the cylinders are placed below the smoke box.

The Roger Williams, 1846.
Marking the transition stage from locomotives of the Governor Bradford type and those of a later period was the Roger Williams. This locomotive was built in Lowell, Mass., and was



THE ROGER WILLIAMS, 1846.

rebuilt and enlarged in 1846. It then weighed twelve tons, had 13 by 16 inch cylinders and five foot drivers. To this locomotive fell the honor of pulling the first passenger train from Providence to Stonington in 1873 on the road, the New York, Providence and Boston, which now forms part of the New Haven's shore line.

The Daniel Nason, 1858.
The Daniel Nason, for many years one of the most famous engines of the Boston and Providence, was another creation of Master Mechanic Griggs. This engine was built in the Roxbury shops in 1858, weighed twenty-five and three-quarter tons and had cylinders measuring 16 by 20 inches and four and one-half foot drivers. A conspicuous feature of these engines was the running board, with its guard rails chiefly to permit the fireman to crawl forward while the locomotive was running and lubricate the cylinders and valves. Locomotives of this type frequently attained a speed of fifty miles an hour. This locomotive continued in service until 1889. It was exhibited at the World's fair at Chicago and is now in the museum at Purdue university.

The Mohegan of the N. & W., 1859.
Engine No. 9 of the old Norwich and Worcester road, now one of the New Haven's leased lines, was a type very common half a century ago and of which numbers are yet to be seen. This locomotive, the Mohegan, was purchased of Samuel Hatch in 1859. It cost \$5,000, an average price for lo-

comotives of that period. This engine weighed 50,300 pounds, had 14 by 22 inch cylinders and four and one-half foot drivers. It made over fifty miles an hour at times.

The Comet of the Hartford and New Haven.

Fairly representative of the American style engine of the sixties was the engine Comet of the Hartford and New Haven, possessing among its features two domes, one for the whistle and one for the safety valve, and having its sand boxes curiously concealed in the wheel covers.

The New Haven Engine of 1879.
The Hercules of the New Haven road is more or less typical likewise of the locomotives of the early eighties, revealing, as compared with its prototypes, a great increase in weight and in the size of the driving wheels. This locomotive was built in the New Haven's

shops in 1879 and weighed 75,200 pounds. Its driving wheels were sixty-three inches in diameter. It was condemned about 1897.

One of the Early Consols, 1880.
Size and power became increasingly evident in the locomotives turned out for these New England roads in the eighties, as shown, for example, in the consolidation engine No. 94 of the New York and New England. This type appears but a few steps behind the present. Built at the Hinckley works in Boston in 1880, the big locomotive reveals the great strides made by the builders of the Governor Bradford in the decades that had intervened.

Without the tender this engine weighed sixty tons. It had 22 by 22 inch cylinders and forty-four inch drivers. It was one of the biggest engines seen east of the Hudson and for years was used in the freight service between Hartford and Hopewell Junction. Big as this engine appears in comparison with the early ones, it would take about four such engines to equal the efficiency of the New Haven's largest engines of today.

Two Early Moguls.
The Mogul type of engine is represented in the Capitol of the old Providence and Worcester road and also in engine 100 of the New York and New England. The latter was built at Providence in 1888 and weighed 127,000 pounds. Its cylinders were 20 by 24 and drivers sixty-eight inches. This locomotive hauled the famous

White Ghost passenger train on the New England between Boston and Wilmington and was the first large Mogul seen in New England. In 1890 it was sold to the Housatonic road and thereafter was used in the freight service.

The New Haven's Giants of Today.
Dwarfing even these large locomotives, however, are the New Haven's Pacific type engines, known as the 1300 series, the embodiment of power and efficiency and capable of tremendous speed if required.

Compared with the fourteen and a half tons of the Governor Bradford, these leviathans of the rail weigh 134,000 pounds on the drivers and have a total weight of 251,500 pounds (384,100 pounds, including tanks). The drivers, instead of being sixty inches in diameter, are seventy-three inches, and there are six of them instead of two. The 12 by 20 inch cylinders of the Governor Bradford have grown into cylinders measuring 24 by 28 inches, and a further metamorphosis has been wrought in the addition of the superheater device by which steam is heated to a very high temperature, which adds 25 per cent to the power and fuel economy of the locomotive. These locomotives exert a tractive force of 37,600 pounds.

The New Haven's Latest Electric Locomotive.

Typical of the new chapter of transportation history which the progress of electrical science has brought about are the New Haven's latest electric locomotives used in hauling passenger and freight trains in its electric zone between New York and New Haven. Differing radically in appearance from the latest steam leviathans, these electric locomotives have little about them to suggest the tremendous tractive force of which they are capable. "A box on wheels" they might be called. Yet these electric locomotives will haul an 800 ton passenger train at a maximum speed of fifty-five miles an hour. They will handle 1,500 ton freight trains at a maximum speed of thirty-five miles an hour.

But more than these electric motors can do. Unlike the steam locomotive, it is possible to hitch two together and operate them with one crew as a single unit on what is called the multiple unit plan, thus doubling the power. Thus two of these locomotives operated by one crew will haul a 1,600 ton passenger train at fifty-five miles an hour and a 3,000 ton freight train at thirty-five miles an hour.

Freight trains of this size, 3,000 tons being the trailing load, are, in fact, operated daily between the New Haven's Harlem river terminal and New Haven.

These electric locomotives weigh 110 tons, 80 per cent of this weight being directly on the four pairs of drivers. The maximum tractive force they can exert is 40,000 pounds, 13,000 pounds continuously. In this type of motor the current, having 11,000 volts, passes from the trolley wire through the pantograph and by means of transformers inside the cab is reduced to 600 volts and is then delivered to the motors. There are eight of these in all, arranged in four groups. These locomotives were built under the combined direction of the engineering forces of the New Haven and the Westinghouse Electric and Manufacturing company,

Secondhand Engines and Cars.

The Independent of June 21, 1915, asks, "What becomes of all the old locomotives and railway cars and those that have outlived their usefulness?" And the paper replies: "They are sold to small roads and to contractors, and the market for them is worldwide."

"When some one in India or Africa wishes to build and equip a railway cheaply and quickly he communicates with an agent in New York, and the rest is easy. There are a number of dealers in secondhand railway equipment in this country. The advertisements of their stock appear in the trade journals. Negotiations are concluded quickly, and it is not long before a big tramp steamer loading at a New York dock has a consignment of hundreds of tons of railway cargo stowed in its hold to be unloaded at some port at the world's end."

"When, some years ago, the motive power of the New York elevated lines was changed from steam to electricity there was sent out one of the largest lots of secondhand railway material ever put on the market—340 engines and 134 cars. So Americans traveling in strange places frequently encounter these old elevated engines. Some are in Africa, some in India; they are scattered all over South America. In Mex-

ico they are used by mining companies that have their own branch lines running to the government roads.

"In Japan, when the emperor's troops started off for Manchuria at the time of the war with Russia, many of the troop trains were hauled by these small nosed engines with the word 'Manhattan' still painted on them. Some of these engines were used on the Mukden railroad in the war.

"These tiny locomotives cost \$5,000 apiece when new; secondhand they fetched from \$2,600 down. The cars were sold at \$400 to \$600 each.

"Cars and engines that have been used on steam railroads of standard gauge bring much higher prices. Practically no freight cars are shipped entire, although there is a good demand for passenger cars. The consumption of these castoffs of the big railroads is mostly among the logging roads of the country. The railroad, as a rule, clings more tenaciously to its cars than to its engines."

Present Railway Efficiency.
With the development of the locomotive the progress in other departments of railroad transportation has naturally kept pace. While in 1840 there were but 429½ miles of completed railroad in the New England states, in 1914 there were 7,822 single track miles in this section and 13,628 total miles of all track. In this respect the United States has far outstripped Europe in the building of railways, for with a census estimated population in 1914 of 98,900,081 the United States had 245,894 miles of

country have increased in number in ten years 146.7 per cent.

The average journey of each passenger on the railroads of the United States during 1914 was thirty-four miles, which compares with an average journey of 26.54 miles in 1894, or an increase of 28.1 per cent. Each train carried in 1914 an average of fifty-nine passengers, compared with forty-four in 1894. There were 1,032,086,000 passengers carried on these railroads in 1914 and 540,688,000 in 1894, an increase of 90.9 per cent, and there were 35,129,269,000 passengers carried one mile in 1914 as compared with 14,289,445,000 passengers carried one mile twenty years ago, an increase of 145.9 per cent.

The number of locomotives in twenty years increased 81.5 per cent, while their weight increased 231.6 per cent. The number of employees increased in the same period 117.9 per cent, and their compensation increased 212.9 per cent. There were 691 employees per hundred miles of line in 1914 and 444 in 1894, an increase of 56.1 per cent.

The present efficiency of American railroads and the low cost of the service may be seen from a comparison of the rates charged for hauling one ton of freight one mile. In the United Kingdom this service costs 2.39 cents, in Germany, 1.37 cents, France 1.30 cents, Russia 1.17 cents, Austria 1.45 cents, while in the United States this service is performed for 7.29 mills, or \$0.00729.

As the people of the United States were the first to grasp the true significance of the discovery that steam could be utilized as a motive power, so they have been first in every stage of railroad development. No European country can boast of such efficient railroad service as that which is performed by the railroads of the United States nor of such low cost of operation. In three-quarters of a century the railroad managers of the country have taken a crude contrivance—the original locomotive—and have constructed out of that idea an efficient machine that is beyond comparison.

When Wives Were Sold.

When the war between Britain and France ended in 1815 many of the English soldiers found that their wives had married again in the belief that they were widows. The formal selling of the wife was regarded among the ignorant as a legal solution to the problem thus presented, and it is said that the authorities of the day deemed it best to shut their eyes at the proceeding. A certain amount of formality had to be observed, however, before the sale was considered legal even by the most ignorant. A Yorkshire writer mentions two conditions which must be carried out to make a satisfactory sale—the price of the wife must not be less than 1 shilling (2½ cents), and she must be delivered to her purchaser with a new halter around her neck. The same writer records the case of the woman who zealously preserved the receipts for herself as a proof of respectability.

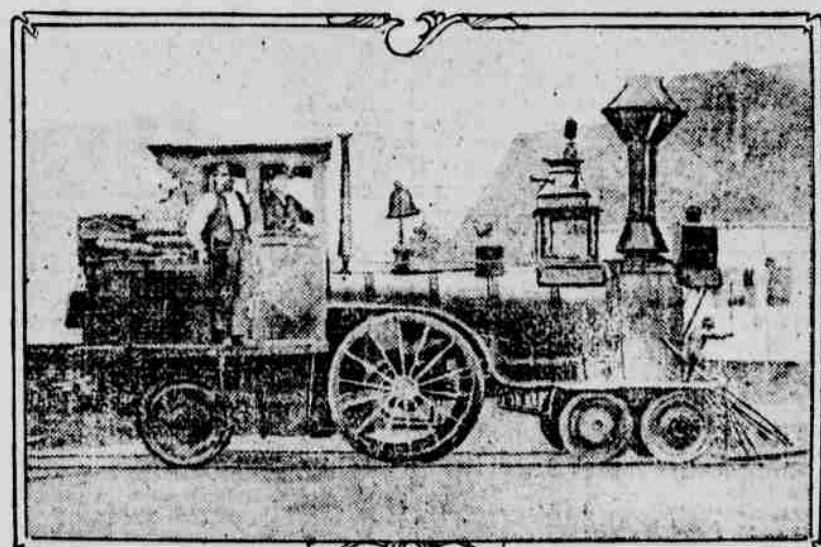
Granada.

Granada was at one time part of the Roman province of Roetia, but after the Arab invasion it became an independent Moorish kingdom. It was the last possession of the Moors in Spain, who tearfully gave up their country to their conquerors, Ferdinand and Isabella of Spain, in 1492.

Not Aloud.

"Oh, dear," groaned the young wife. "I don't know what to use to raise my bread! I've tried everything."

"A derick and a couple of jackscrows ought to do it," thought her husband, but he didn't say it aloud.—Philadelphia Ledger.



THE UNCLE TOM, 1844.